# SCIENCE NEWS-LETTER

*The Weekly Summary of Current Science*

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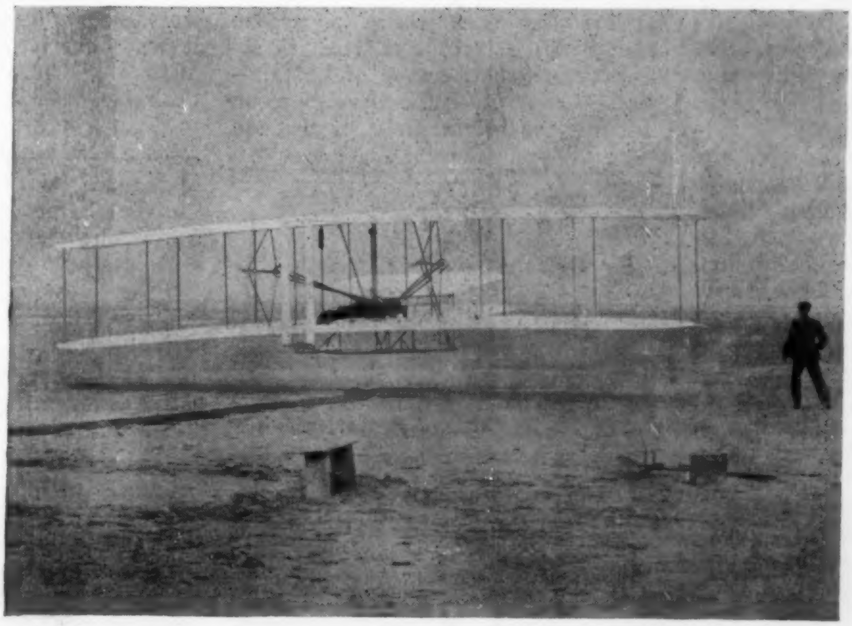

## DÆDALUS VINDICATUS!

*First Flight of the Wright Plane, Twenty-Five Years Ago*

(*See page* 349)

Vol. XIV No. 400

# Astronomers Preparing for Eclipse

*Astronomy*

Astronomers from the U. S. Naval Observatory in Washington and from the Sproul Observatory, Swarthmore, Pa., will join with colleagues from Germany, England, Italy, France, Holland and Australia, in observing the eclipse of the sun visible in the Malay Archipelago next May. It will be the best eclipse in recent years, and will occur on the afternoon of May 9. The path of totalty begins to the east of South Africa, in the Indian Ocean. From there is passes in a northeast direction to the Malay Archipelago, where it first touches easily accessible land.

In Malaysia it crosses the northern end of Sumatra, then the Malay Straits, the southern part of Siam and the northern part of the Malay Peninsula, the Gulf of Siam, Cochin China, the South China Sea, and some of the southern Philippine Islands. Then it passes into the Pacific Ocean where it ends.

Though along part of its path the eclipse lasts 5 minutes and 7 seconds, this part is out in the Indian Ocean. The Simeuloe Islands, west of Sumatra, are nearest to the maximum, where the total eclipse will last nearly that long. In Sumatra, it will last five minutes, and in the Philippines about three and a half minutes.

Capt. C. R. Freeman, of the U. S. Naval Observatory at Washington, has announced that their expedition will go to Iloilo, on the island of Panay. This is one of the largest towns in the path of totality. It has about 50,000 inhabitants and is provided with banks, hotels, machine shops and other features which visiting astronomers may need. Telegraph, radio and telephone connections will enable the outside world to be informed promptly of the outcome. The Panay and Negros Telephone Company supplies most of the towns in this part of the path, and the company has offered the free use of its lines to visiting astronomers. Dr. R. L. Waterfield, of the Johns Hopkins University, is also planning to observe it from Iloilo.

The Sproul Observatory, of Swarthmore, Pa., under the direction of Prof. John A. Miller, who has observed more eclipses than any other astronomer, will send a party to Sumatra. There will also be a Dutch expedition in Sumatra as well as one from Australia. A German party from Potsdam will go either to Sumatra or Siam. There will be two British groups. One, from Greenwich, will go to Alor Sta, in Kedah, on the Malay Peninsula. The other, from Cambridge, will make its headquarters at Pattani, in Siam. There will be a German party, from Kiel, in Siam, at Khoke Bhode. A third German expedition, from Göttingen, has not yet announced its site, while a fourth, from Hamburg, will be neighbors of the U. S. Naval astronomers at Iloilo. A French party will go to Cochin China. There will also be one from Italy.

Perhaps the most important observations to be made will be the photography of the corona. This is the outer part of the sun, and though extending for as much as a million miles from the sun's surface, is ordinarily invisible because of its faintness. Only when the opaque moon obscures the bright globe of the sun does the corona flash out. An eclipse of the sun cannot possibly last more than 7 minutes and 40 seconds. Most are much shorter, and as one that can be satisfactorily observed occurs on the average only once in several years, the astronomers make the most of their opportunities of observing this important part of the sun. Other observations will be made of the flash spectrum, at the beginning or end of an eclipse. This gives important knowledge of the outer layer of the sun, the "chromosphere." The English astronomers will also observe the "Einstein effect." This is the deflection of the light of stars as they pass the sun, and can onlv be observed during a total eclipse. This is one of the experimental proofs of the Einstein theory of relativity, and though it was found to exist at eclipses in 1919 and 1922, further evidence is desirable.

*Science News-Letter, December 8, 1928*

## *In This Issue—*



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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

# How Man Learned to Fly

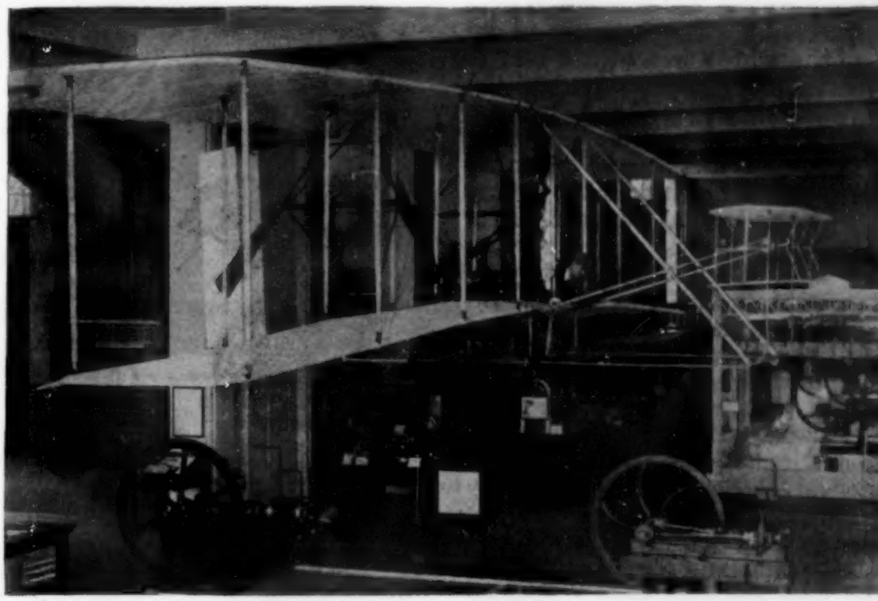
*Aviation*

By Edwin E. Slosson

No man in all the history of the world has had such an experience as Orville Wright. He can look up almost any time and see men flying above his Dayton home and be reminded that he and his brother were the first of all mortal men to soar into the air, twenty-five years ago. No discoverer or inventor has seen so radical a revolution of the world in such a short time. Not Columbus, for he died before he knew that he had found a new continent. Not Watt, for the steam engine did not fully reveal its power in his lifetime. Bell when he heard telephones on every hand and Edison when he could see the streets lit by his electric lamps, could come nearest to realizing the transformation of daily life effected by their inventions, but these were developed gradually under normal conditions as fast as a market could be opened for them, while aviation was forced into premature maturity by the Great War which compelled all nations to engage in the advancement of its actual application regardless of expense and danger.

The conquest of the air, completely accomplished within the present century, fulfilled one of the dearest desires of the human heart from the earliest ages. "Birds can fly so why can't I?" This mental query which led Darius Green to launch his flying machine from the barn loft had puzzled the brains of inventive minds of all periods and places. The walls of ancient Egypt and Assyria are carved with the figures of winged men. Mankind had always longed for wings, dreamed of them, prayed for them, hoped to be good enough to go to heaven where "all God's children got wings." This suppressed desire, dating back to the childhood of the race, was first realized on earth at Kill Devil Hill, Kitty Hawk, North Carolina, on December 17, 1903, when Orville Wright flew 120 feet in 12 seconds.

How the young bicycle makers of Dayton got interested in aviation and how they began their experiments may be best read in the words of the elder brother in the first account given of their first flights with gliders, the epoch-making paper read by Wilbur Wright before the Western Society of Engineers, September 18, 1901, and published in the Smithsonian Report in 1902:



*THE ORIGINAL WRIGHT PLANE, as it now hangs in the Science Museum at Kensington, England*

"My own active interest in aeronautical problems dates back to the death of Lilienthal in 1896. The brief notice of his death which appeared in the telegraphic news at that time aroused a passive interest which had existed from my childhood and led me to take down from the shelves of our home library a book on Animal Mechanism, by Professor Marey, which I had already read several times. From this I was led to read more modern works, and as my brother soon became equally interested with myself we soon passed from the reading to the thinking, and finally to the working stage. It seemed to us that the main reason why the problem had remained so long unsolved was that no one had been able to obtain any adequate practice. We figured that Lilienthal in five years of time had spent only about five hours in actual gliding through the air. The wonder was not that he had done so little, but that he had accomplished so much. It would not be considered at all safe for a bicycle rider to attempt to ride through a crowded city street after only five hours' practice, spread out in bits of ten seconds each over a period of five years; yet Lilienthal with this brief practice was remarkably successful in meeting the fluctuations and eddies of wind gusts. We thought that if some method could be found by which it would be possible to practice by the hour instead of by the second there would be hope of advancing the solution of a very difficult problem. It seemed feasible to do this by building a machine which would be sustained at a speed of 18 miles per hour, and then finding a locality where winds of this velocity were common."

It was then a failure and a fatal accident that inspired the Wright brothers to enter aviation and so achieve their triumph. For reading of the death of Lilienthal in 1896 papers incited them to take up the task left unfinished by his death. Like Lilienthal the Dayton brothers tackled the problem from what we all can now see was the right end. They determined to learn to fly before they made their flying machine. Most inventors had adopted the opposite procedure and assumed that they must perfect their machine before they got into it. Otto Lilienthal watched the young storks learning to fly and noticed that they always faced the wind. Then he made of willow work and cotton cloth a pair of wings and a tail like those of a stork, and built up a 50-foot mound to jump off from since hills were scarce in his Pomeranian plains. He practiced with gliders until he could fly sometimes 300 yards and rise higher than his hill. After learning the (*Turn to next page*)

# How Man Learned to Fly—*Continued*

art of flying by such practice the next step was to attach a motor, but before he could try this his experiments were terminated by a fall from the height of a hundred feet in a high wind. It is interesting to see that when the Germans were prohibited by the Treaty of Versailles from constructing airplanes they turned again to gliders and found it possible to stay in the air as long as daylight lasted.

The Wright boys, who were running a bicycle factory in Dayton, Ohio, sent to the Smithsonian Institution for the reports of the experiments in mechanical flight that were being made by its Secretary, Samuel P. Langley, and for such other literature as they could get on aeronautics. Getting more enthusiastic on the possibilities as they found out more about the subject they built a glider in 1900 and looked about for a locality where the wind blew and hills gave a jumping off place. On advice from the Weather Bureau at Washington they selected the coast of North Carolina at Kitty Hawk. For two seasons they tried out their gliders on the sand dunes, constantly gaining skill in the art of flying but without solving the secret of proper balance. Realizing then that the tables on which they had relied were wrong they made a wind tunnel in their shop during the winter of 1901-2 and figured new measurements for the balance and proportion of the plane with the aid of their school-ma'am sister (now Mrs. Katherine Wright Haskell of Kansas City).

The Wright brothers completed their motored glider, the first real airplane, in their bicycle shop at Dayton in September, 1903, and, by the time they got it set up at Kitty Hawk, there was time for only one day's trial. But that was enough. For on December 17, 1903, four flights were made, the two brothers taking turns in the machine. There were five witnesses and a photograph was taken in flight.

It was nearly four years before this feat was equalled by anyone else, even in France where interest in aviation was most active. Santos Dumont, on November 12, 1908, made a flight of 238 yards in 21 seconds, Henry Farman on October 26, 1907, remained in the air 56 seconds and flew nearly half a mile. But by that time the Wrights were doing 25 miles at a flight.

An historic event like this should

*ORVILLE WRIGHT lives to see mankind in full flight*

be given wherever possible in the words of a first hand authority, so here it is best to quote the description of the first flight as reported by Orville Wright in "Flying," December, 1913:

"With all the knowledge and skill acquired in thousands of flights in the last ten years, I would hardly think today of making my first flight on a strange machine in a twenty-seven-mile wind, even if I knew that the machine had already been flown and was safe. After these years of experience I look with amazement on our audacity in attempting flights with a new and untried machine under such circumstances. Yet faith in our calculations and the design of this first machine, based upon our tables of air pressures, secured by months of careful laboratory work, and confidence in our system of control developed by three years of actual experience in balancing gliders in the air had convinced us that the machine was capable of lifting and maintaining itself in the air, and that, with a little practice, it could be safely flown.

"Wilbur, having used his turn in the unsuccessful attempt on the 14th, the right to the first trial now belonged to me. After running the motor a few minutes to heat it up, I released the wire that held the machine to the track, and the machine started forward into the wind. Wilbur ran at the side of the machine, holding the wing to balance it on the track. Unlike the start on the 14th, made in a calm, the machine, facing a 27-mile wind, started very slowly. Wilbur was able to stay with it till it lifted from the track after a forty-foot run. One of the Life Saving men snapped the camera for us, taking a picture just as the machine had reached the end of the track and had risen to a height of about two feet. The slow forward speed of the machine over the ground is clearly shown in the picture by Wilbur's attitude. He stayed along beside the machine without any effort.

"This flight lasted only 12 seconds, but it was nevertheless the first in the history of the world in which a machine carrying a man had raised itself by its own power into the air in full flight, had sailed forward without reduction of speed, and had finally landed at a point as high as that from which it started.

"At twenty minutes after eleven Wilbur started on the second flight. The course of this flight was much like that of the first, very much up and down. The speed over the ground was somewhat faster than that of the first flight, due to the lesser wind. The duration of the flight was less than a second longer than the first, but the distance covered was about seventy-five feet greater.

"Twenty minutes later the third flight started. This one was steadier than the first one an hour before. I was proceeding along pretty well when a sudden gust from the right lifted the machine up twelve to fifteen feet and turned it up sidewise in an alarming manner. It began a lively sidling off to the left. I warped the wings to try to recover the lateral balance and at the same time pointed the machine down to reach the ground as quickly as possible. The lateral control was more effective than I had imagined and before I reached the ground the right wing was lower than the left and struck first. The time of this flight was fifteen seconds and the distance over the ground a little over 200 feet.

"Wilbur started the fourth and last flight at just 12 o'clock. The first few hundred feet were up and down as before, but by the time three hundred feet had been covered, the machine was (*Turn to next page*)

# How Man Learned to Fly—*Continued*

under much better control. The course for the next four or five hundred feet had but little undulation. However, when out about eight hundred feet the machine began pitching again, and, in one of its darts downward, struck the ground. The distance over the ground was measured and found to be 852 feet; the time of the flight 59 seconds."

The Wright brothers were so enraptured with the action of flying that they neglected their business and sold their Iowa farm in order to spend their summers in trying out and smashing up machines and their winters in trying to figure out why they did not work and in designing better ones. Meanwhile they were gaining confidence and competency in the art of aviation. They set up a shed in a field eight miles out of Dayton and here on September 20, 1904, Wilbur Wright completed a circular flight. In 1905 they were able to rise over fifty feet in the air and to stay up over half an hour.

Such flights were unprecedented anywhere in the world, but they aroused little interest in the farmers who watched them from the fields about Dayton or the newspaper men who were invited to witness them. The public, fooled so often by false alarms, had become skeptical and editors were scary of any flying stories. Even as late as 1908, as Mark Sullivan tells us, the *Cleveland Leader* refused to pay telegraph tolls on a dispatch telling of the amazing flights at Kitty Hawk and the editor sent back a sharp message to "cut out the wildcat stuff."

During the five years when the Wrights were perfecting their airplane and practicing the art of aviation hundreds of persons had seen them in the air about Dayton or Kitty Hawk at one time or another, yet on the whole America and France declined to believe that flying was an accomplished fact. The Wrights did not attempt to conceal their experiments, but they avoided publicity and refused, on account of pending patents, to give out detailed descriptions or allow their airplanes to be photographed.

But by 1908 they were ready for a public demonstration of what they had been doing and this was made in a way to convince the most skeptical on both sides of the Atlantic simultaneously. For this purpose

*WILBUR WRIGHT pioneered; passed on*

the two brothers, hitherto inseparable, parted company and in September, 1908, Orville Wright at Fort Myer, Va., met the rigorous requirements of the U. S. Army Signal Corps, and Wilbur Wright at Le Mans, France, won the Michelin prize of $4,000 and a trophy valued at $2,500.

The Army specifications for a heavier-than-air machine were that it must be capable of remaining in the air for one hour, of making 36 miles an hour against and with the wind, and of carrying a passenger and fuel for 125 miles. On September 12 Orville Wright made a record flight of one hour and 14 1/3 minutes. A speed of 40 miles an hour was made and passengers carried on several flights. But on September 17 a breaking propeller blade threw the machine to the ground, causing the death of Lieut. Selfridge and serious injury to Mr. Wright. This was the first airplane bought by any government in the world.

In France Wilbur Wright on September 21 made a continuous flight of one hour and 31 minutes and before the end of the year had extended this time to more than two hours and covered a distance of more than ninety miles. The French were so captivated by his success that a syndicate purchased the patent rights and engaged him to train aviators at Pau.

New Yorkers had their first chance to become convinced with their own eyes that flying was a possibility during the Hudson-Fulton celebration, when Wilbur Wright flew from Governor's Island to Grant's Tomb and back. This made the Hudson the scene of three epoch-making events in the history of transportation. The "Half-Moon" sailed up the river in 1609; the "Clermont" steamed up it in 1807; and the Wright airplane flew up it in 1909.

On December 5, 1908, Alexander Graham Bell wrote to Secretary Walcott of the Smithsonian Institution: "The Wright brothers are being deservedly honored in Europe. Can not America do anything for them? Why should not the Smithsonian Institution give a Langley medal to encourage aviation?"

At this instigation the Smithsonian Institution established the Langley medal and awarded it for the first time to Wilbur and Orville Wright "for advancing the science of aerodromics in the application to aviation by their successful investigations and demonstrations of the practicality of mechanical flight by man."

The secret of the success of the Wright brothers lay in their peculiar combination of venturesomeness and caution. They were willing to risk their own lives day after day in trying out uncontrollable gliders and capricious airplanes, but they opposed stunt flying from the start. The French were inclined to sneer at Wilbur Wright because he would not attempt flying unless his machine and the weather were just right to suit him, and then he went no further than the specified distance to meet the conditions of the competition. At the Hudson-Fulton celebration he waited patiently at Governor's Island regardless of the growing impatience and incredulity of the crowds on the banks of the Hudson, then, late in the day when the wind fell, he slipped up the river so quietly and quickly that many of them failed to see him. The two brothers so congenial in disposition and complementary in talents formed an ideal firm for the pioneer enterprise. In 1912 this historic partnership was dissolved by the death of Wilbur from typhoid.

*Science News-Letter, December 8, 1928*

## Competition Aids Invention

*General Science*

ARTHUR D. LITTLE, in *The Handwriting on the Wall* (Little, Brown).

Our industries are entering upon a long period of super-competition, the duration of which will in large measure be determined by conditions in Europe or our own relations to them. As foreign markets are restricted, competition at home will be intensified. As the pressure increases, our manufacturers will be forced to rely more and more generally upon the scientific method for the control of materials and processes and to support intensive research as the basis for industrial development. We may hope to see the stupendous wastes which accompany our present operations minimized, and resources, now neglected, utilized to great advantage. Such abundant metals as beryllium, hafnium, calcium, and magnesium will be utilized. Our wastes in cereal straw will be turned to account. The lumberman will be brought to realize that he is leaving behind or burning up greater values than he markets. Pure iron, bright as silver and little subject to corrosion, will be available for a thousand uses.

*Science News-Letter, December 8, 1928*

# CLASSICS OF SCIENCE: The First Flight

*Aviation*

**This is the inventor's account of the first successful flight of a power-driven plane.**

*HOW WE MADE THE FIRST FLIGHT, by Orville Wright, published in "Flying," December, 1913.*

## *The Motor*

The flights of the 1902 glider had demonstrated the efficiency of our system of maintaining equilibrium, and also the accuracy of the laboratory work upon which the design of the glider was based. We then felt that we were prepared to calculate in advance the performance of machines with a degree of accuracy that had never been possible with the data and tables possessed by our predecessors. Before leaving camp in 1902 we were already at work on the general design of a new machine which we proposed to propel with a motor. . . .

Finally we decided to undertake the building of the motor ourselves. We estimated that we could make one of four cylinders with 4-inch bore and 4-inch stroke, weighing not over two hundred pounds, including all accessories. . . . In just six weeks from the time the design was started, we had the motor on the block testing its power.

. . . In these short tests the motor developed about nine horsepower. We were then satisfied that, with proper lubrication, and better adjustments, a little more power could be expected. The completion of the motor according to drawing was, therefore, proceeded with at once.

## *Weight and Thrust*

While Mr. Taylor was engaged with this work, Wilbur and I were busy in completing the design of the machine itself. The preliminary tests of the motor having convinced us that more than 8 horsepower would be secured, we felt free to add enough weight to build a more substantial machine than we had originally contemplated.

Our tables of air pressures and our experience in flying with the 1902 glider, enabled us, we thought, to calculate exactly the thrust necessary to sustain the machine in flight. But to design a propeller that would give this thrust with the power we had at our command, was a matter we had not as yet seriously considered. No data on air propellers were available, but we had always understood that it was not a difficult matter to secure an efficiency of 50 per cent with marine propellers. All that would be necessary would be to learn the theory of the operation of marine propellers from books on marine engineering, and then substitute air pressures for water pressures. Accordingly we secured several such books from the Dayton Public Library. Much to our surprise, all the formulae on propellers contained in these books were of an empirical nature. There was no way of adapting them to calculations of aerial propellers. As we could afford neither the time nor expense of a long series of experiments to find by trial a propeller suitable for our machine, we decided to rely more on theory than was the practice with marine engineers.

It was apparent that a propeller was simply an aeroplane travelling in a spiral course. As we could calculate the effect of an aeroplane travelling in a straight course, why should we not be able to calculate the effect of one travelling in a spiral course? At first glance this does not appear difficult, but on further consideration it is hard to find even a point from which to make a start; for nothing about a propeller, or the medium in which it acts, stands still for a moment. The thrust depends upon the speed and the angle at which the blade strikes the air; the angle at which the blade strikes the air depends upon the speed at which the propeller is turning, the speed the machine is travelling forward, and the speed at which the air is slipping backward; the slip of the air backwards depends upon the thrust exerted by the propeller, and the amount of air acted upon. When any one of these changes, it changes all the rest, as they are all interdependent upon one another. But these are only a few of the many factors that must be considered and determined in calculating and designing propellers. Our minds became so obsessed with it that we could do little other work. We engaged in innumerable discussions, and often after an hour of so of heated argument, we would discover that we were as far from agreement as when we started, but that both had changed to the other's original position in the discussion. After a couple of months of this study and discussion, we were able to follow the various reactions in their intricate relations long enough to begin to understand them. We realized that the thrust generated by a propeller when standing stationary was no indication of the thrust when in motion. The only way to really test the efficiency of a propeller would be to actually try it on the machine. . . .

## *The Power Plant*

When the motor was completed and tested, we found that it would develop 16 horsepower for a few seconds, but that the power rapidly dropped till, at the end of a minute, it was only 12 horsepower. Ignorant of what a motor of this size ought to develop, we were greatly pleased with its performance. More experience showed us that we did not get one-half of the power we should have had.

With 12 horsepower at our command, we considered that we could permit the weight of the machine with operator to rise to 750 or 800 pounds, and still have as much surplus power as we had originally allowed for in the first estimate of 550 pounds. . . .

We left Dayton September 23 and arrived at our camp at Kill Devil Hill on Friday, the 25th. We found there provisions and tools which had been shipped by freight, several weeks in advance. The building, erected in 1901 and enlarged in 1902, was found to have been blown by a storm from its foundation posts a few months previously. While we were awaiting the arrival of the shipment of machinery and parts from Dayton, we were busy putting the old building in repair, and erecting a new building to serve as a workshop for assembling and housing the new machine.

Just as the building was being completed, the parts and material for the machines arrived simultaneously with one of the worst storms that had visited Kitty Hawk for years. . . .

The next three weeks were spent in setting the motor-machine together. On days with more favorable winds we gained additional experience in handling a flyer by gliding with the 1902 machine, which we had found in pretty fair condition in the old building, where we had left it the year before.

Mr. Chanute and Dr. Spratt, who had been guests in our camp in 1901 and 1902, spent some time with us, but neither one *(Turn to next page)*

# The First Flight—*Continued*

was able to remain to see the test of the motor-machine, on account of the delays caused by trouble which developed in the propeller shafts. . . .

Just as the machine was ready for test, bad weather set in. It had been disagreeably cold for several weeks, so cold that we could scarcely work on the machine some days. But now we began to have rain and snow, and a wind of 25 to 30 miles blew for several days from the north. While we were being delayed by the weather we arranged a mechanism to measure automatically the duration of a flight from the time the machine started to move forward to the time it stopped, the distance travelled through the air in that time, and the number of revolutions made by the motor and propeller. A stop watch took the time; an anemometer measured the air travelled through; and a counter anemometer and revolution counter were all automatically started and stopped simultaneously. From data thus obtained we expected to prove or disprove the accuracy of our propeller calculations.

## *Propeller Shaft Trouble*

On November 28, while giving the motor a run indoors, we thought we again saw something wrong with one of the propeller shafts. On stopping the motor we discovered that one of the tubular shafts had cracked!

Immediate preparation was made for returning to Dayton to build another set of shafts. We decided to abandon the use of tubes, as they did not afford enough spring to take up the shocks of premature or missed explosions of the motor. Solid tool-steel shafts of smaller diameter than the tubes previously used were decided upon. These would allow a certain amount of spring. The tubular shafts were many times stronger than would have been necessary to transmit the power of our motor if the strains upon them had been uniform. But the large hollow shafts had no spring in them to absorb the unequal strains.

Wilbur remained in camp while I went to get the new shafts. I did not get back to camp again till Friday, the 11th of December. Saturday afternoon the machine was again ready for trial, but the wind was so light, a start could not have been made from level ground with the run of only sixty feet permitted by our mono-rail track Nor was there enough time before day to take the machine to one of the hills, where, by placing the track on a steep incline, sufficient speed could be secured for starting in calm air.

Monday, December 14th, was a beautiful day, but there was not enough wind to enable a start to be made from the level ground about camp. We therefore decided to attempt a flght from the side of the big Kill Devil Hill. . . . We laid the track 150 feet up the side of the hill on a 9-degree slope. With the slope of the track, the thrust of the propellers and the machine starting directly into the wind, we did not anticipate any trouble in getting up flying speed on the 60-foot mono-rail track. But we did not feel certain the operator could keep the machine balanced on the track.

## *The First Attempt*

When the machine had been fastened with a wire to the track, so that it could not start until released by the operator, and the motor had been run to make sure that it was in condition, we tossed up a coin to decide who should have the first trial. Wilbut won. I took a position at one of the wings, intending to help balance the machine as it ran down the track. But when the restraining wire was slipped, the machine started off so quickly I could stay with it only a few feet. After a 35- to 40-foot run, it lifted from the rail. But it was allowed to turn up too much. It climbed a few feet, stalled, and then settled to the ground near the foot of the hill, 105 feet below. My stop watch showed that it had been in the air just 3½ seconds. In landing the left wing touched first. The machine swung around, dug the skids into the sand and broke one of them. Several other parts were also broken, but the damage to the machine was not serious. While the test had shown nothing as to whether the power of the motor was sufficient to keep the machine up, since the landing was made many feet below the starting point, the experiment had demonstrated that the method adopted for launching the machine was a safe and practical one. On the whole, we were much pleased. . . .

During the night of December 16th, 1903, a strong cold wind blew from the north. When we arose on the morning of the 17th, the puddles of water, which had been standing about the camp since the recent rains, were covered with ice. The wind had a velocity of 10 to 12 metres per second (22 to 27 miles an hour). We thought it would die down before long, and so remained indoors the early part of the morning. But when ten o'clock arrived, and the wind was as brisk as ever, we decided that we had better get the machine out and attempt a flight. We hung out the signal for the men of the Life Saving Station. We thought that by facing the flyer into a strong wind, there ought to be no trouble in launching it from the level ground about camp. We realized the difficulties of flying in so high a wind, but estimated that the added dangers in flight would be partly compensated for by the slower speed in landing. . . .

The frame supporting the front rudder was badly broken, but the main part of the machine was not injured at all. We estimated that the machine could be put in condition for flight again in a day or two.

While we were standing about discussing this last flight, a sudden strong gust of wind struck the machine and began to turn it over. Everybody made a rush for it. Wilbur, who was at one end, seized it in front, Mr. Daniels and I, who were behind, tried to stop it by holding to the rear uprights. All our efforts were in vain. The machine rolled over and over. Daniels, who had retained his grip, was carried along with it, and was thrown about head over heels inside of the machine. Fortunately he was not seriously injured, though badly bruised in falling about against the motor, chain guides, etc. The ribs in the surface of the machine were broken, the motor injured and the chain guides badly bent, so that all possibility of further flights with it for that year were at an end.

*Science News-Letter, December 8, 1928*

# Incas' Sickness Traced

*Pathology*

Modern science has taken the final step in the conquest of a disease that afflicted the old Incas before the Spanish invaded Peru and that has persisted in that country until our time. The final work was done according to plans arranged by the late Dr. Hideyo Noguchi just before he sailed for Africa, where he died last spring, a victim of yellow fever which he was studying.

The ancient disease, known as Oroya fever or verruga, is caused by a germ and is transmitted by a blood-sucking gnat peculiar to the locality where the disease exists, scientists from the Rockefeller Institute report in *Science*. These investigators who have established the final link in the chain by proving that the disease is spread by the gnat are the late Dr. Noguchi, Raymond C. Shannon, Evelyn B. Tilden and Joseph R. Tyler.

The disease is characterized by numerous warts, which vary in size from small red prominences to masses as large as eggs. The old name for it, verruga, refers particularly to these warts. The ailment is also often accompanied by a severe fever and anemia and it is often fatal.

Its occurrence is confined to certain narrow clefts in the mountains of Peru. During the construction of a railway through the mountains in 1870 thousands of the workers died of the disease. It was noticed that only those who stayed in the mountain clefts overnight fell sick. This led scientific investigators to suspect that an insect was carrying it, particularly an insect that bites by night alone.

An American entomologist, Charles H. T. Townsend, found that a gnat called *Phlebotomus* is the guilty transmitter. The Rockefeller investigators later found two other species of phlebotomi that are capable of carrying the germs.

During the last century scientists were not sure that the two diseases, Oroya fever and verruga, were the same, because some patients had warts with mild fever, some severe fever with no warts. To settle the question, a medical student, David Carrion, inoculated himself on both arms with tissue juice taken from the warts of verruga. He developed Oroya fever and died, another of the martyrs of science.

*Science News-Letter, December 8, 1928*

# "Maya Bible" Translated

*Archæology*

A new translation has appeared of the "Maya Bible," the Popol Buj, as it was called by the Indian convert to Christianity who wrote it down a few years after the Spanish conquest of his country in 1524.

The original, in a dialect of the Mayan language, expressed phonetically in Latin characters, was written by Diego Reynoso, it is believed, early in the sixteenth century. It was lost and was only rediscovered at the end of the seventeenth century.

The "Popol Buj", which means "collection of written pages", is divided into a preamble and eleven "traditions," that begin with the creation of the world and end with the Spanish Conquest.

The first tradition explains the creation of the world and of living creatures, and their final destruction in great cataclysms. The second and third tell of the first arrival of the "Toltecs" in the tropical lands of what is now Guatemala, and their battles for the right to stay, while the fourth embodies a delightful legend symbolizing union between the races.

*Science News-Letter, December 8, 1928*

# Bean Disease in West

*Phytopathology*

Large acreages of beans have been destroyed by a bacterial disease known as "halo spot" in Montana, Wyoming and Colorado.

Reports of the damage caused by this relatively new disease have been made to the U. S. Department of Agriculture by Miss Florence Hedges, as the result of a field trip this summer. *Bacterium medicaginis phaseolicola* is believed to be the cause of halo blight, which may be introduced into new fields through infected seed although the amount of loss resulting is dependent upon a number of factors among which are unfavorable weather conditions. The disease has also been found in the trucking sections of Florida, southwestern Georgia and South Carolina. All of the most popular canning varieties of beans, with the exception of the Refugees, are very susceptible to halo blight, but the fact that the Refugees are quite resistant to this disease, gives the agricultural experts hope that it will be possible to combat this disease invasion of the bean crop by breeding new resistant varieties.

*Science News-Letter, December 8, 1928*

## Nature Ramblings

By Frank Thone

*Natural History*

### *A Roughneck in Fine Feathers*

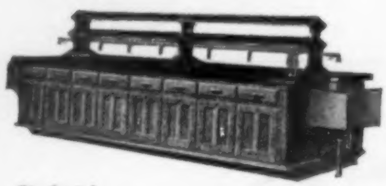
With the summer birds pretty completely gone, we are turning to the permanent, year-round boarders for such consolation as they can give us. It takes a hardy bird to stand a northern winter; no wonder then if some of these hardy fellows turn out to be a bit tough.

Of such is the tribe of the bluejay. He is a roughneck in fine feathers, a roystering, blustering, obstreperous gangster in clothes that are well-tailored but "swell" rather than elegant. You can't help liking the fellow after a fashion, just as you can't help admitting that some of our modern city bandits have a picturesque and even a rather engaging side to their lamentably shady characters.

But it can never be forgotten that for all his fine feathers the bluejay is a roughneck still, a robber and a thug with innocent blood on his beak. The same bird that flashes brilliantly around your charitable lump of suet during the coming winter, last summer got his animal food partly by raiding the nests of smaller birds and spearing their eggs and swallowing their unfledged offspring. Not so attractive a picture, that. It is for this reason that in many places the protection of the law is withheld from the jay, and it is accounted something of an act of virtue to waylay and kill him.

Yet, even in performing such an act of justice, we must be assailed with doubts. When we think of him in connection with other birds we must condemn him as a murderer, but when we think of him in connection with grasshoppers he almost appears as a policeman. But no sooner does he begin to acquire a little virtue in this way than we catch him in an orchard as a thief. Most truly, a person of a very complex character is the bluejay.

*Science News-Letter, December 8, 1928*



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**Tree Ancestors:** By E. W. BERRY. So many people have trees. And this is a tree book that is "different"—it tells of the ancestry of our common tree stocks, a fascinating story of shifting habitat; how they come to be *what* they are and *where* they are. $3.00.

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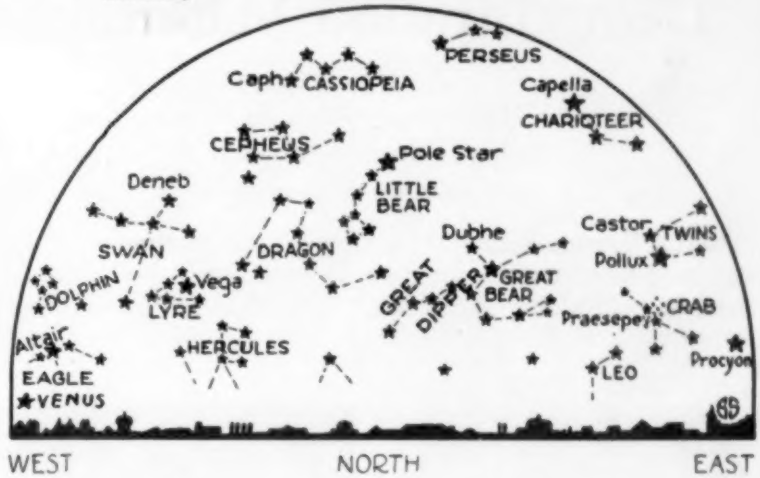
# Planets and Meteors in December Skies

*Astronomy*

By James Stokley



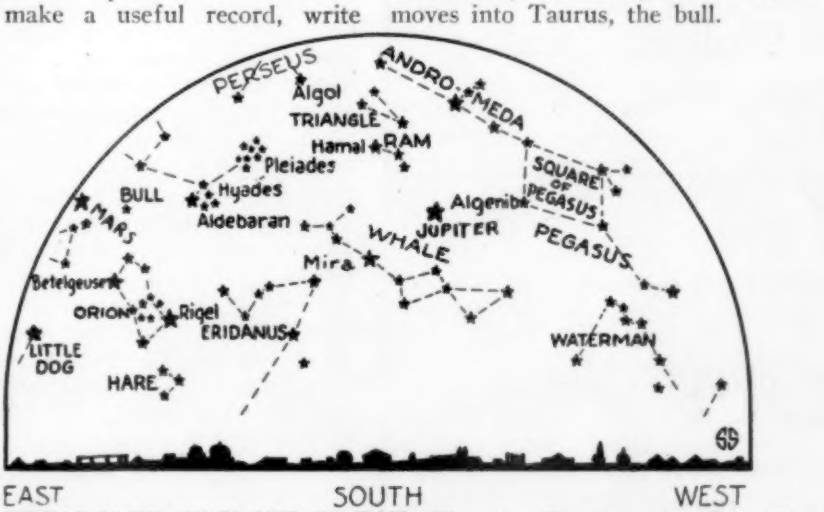

December is not the month that we ordinarily think of in connection with meteor displays—those of August and November are more prominent, and much better known. But the December meteors have one advantage—their light is especially blue, and so they can be most easily photographed. In fact, the amateur photographer can have the fun of taking some pictures of these visitors from space, and, at the same time, can contribute to science, if he cares to stay up a little later than usual on one or two December nights.

The principal shower of December is that of the Geminids. It receives its name, like all meteor showers, from the constellation from which it seems to emerge—in this case, Gemini, the twins. This group is in the eastern sky on December evenings. The meteors reach their maximum on the nights of the tenth to thirteenth. Fortunately, the new moon occurs on the twelfth, so that during this period the nights will be completely dark.

To photograph them you should point your camera at the sky between Orion and Taurus on the nights of December 10 to 13, especially between the hours of midnight and dawn. Fix the camera pointing a little below the Hyades—the V-shaped group with a bright reddish star at the eastern end of the V. Expose for an hour at the maximum aperture, then point below the Hyades, and expose another plate or film for an hour. Keep on shifting between exposures, to keep the region between Orion and Taurus on the plate.

To make a useful record, write down the standard times of opening and closing the shutter and where the exposure was made, accurately enough to locate it on a good map. The negatives—not prints—would be gladly received at the Harvard Observatory, Cambridge, Mass., it has been announced, where they would be searched.

Three planets now decorate the evening sky. In the west for several hours after sunset Venus appears. It is brighter than any other planet or star in the sky, and so it is not hard to locate. Jupiter is in the southern sky, and is second only to Venus in brilliancy. Over in the east is Mars, of a brilliant red color. Mars is inferior in brightness only to Venus, Jupiter and the star Sirius, the brilliant one low in the southeastern sky. Mars' ruddy color, however, affords a means of identification. Until the 23rd it is in the constellation of Gemini, the twins, after which it moves into Taurus, the bull.




*HOLD THESE MAPS IN FRONT OF YOU. The upper then shows you the northern and the lower the southern sky as it appears on December evenings*

This month Mars is in opposition. That means that it is on the side of the earth directly opposite the sun, and that at midnight it is directly south. It reaches this position on the 21st. A few days before—on the 15th—it is at its closest position to the earth on this trip. At that time it is only 54,343,200 miles from the earth.

A number of bright stars can be seen in the sky now, as the winter presents some of the most brilliant. Sirius, the "Dog-Star," in the constellation of Canis Major, the Great Dog, is low in the southeast in the early evening, and has already been mentioned. A little higher, and almost directly east, is the lesser dog, Canis Minor, with the first magnitude Procyon. Above Sirius is the familiar group of Orion. The three stars in a vertical row form the warrior's belt, the row of stars descending from it are his sword. The bright, and reddish, star to the north is Betelgeuse, the brilliant one above the belt is Bellatrix, while the one to the south is Rigel. Above Orion is Taurus, the bull, with Aldebaran marking the eye of the bull. This star is even more ruddy than Betelgeuse. To the north of Taurus is Auriga, the charioteer, marked by the bright Capella. Between Auriga and Canis Minor are Gemini, the twins. The two bright stars are the two twins, Castor (above) and Pollux (below). Pollux is the brighter of the two. In the west is Pegasus, with the familiar "Great Square," and to the northwest, in a vertical position, is the northern cross, or Cygnus, the swan, with the first magnitude Deneb at the top.

*Science News-Letter, December 8, 1928*

## The Future of Aviation

*Aviation*

Octave Chanute, in an address before the American Association for the Advancement of Science, December 30, 1903 (thirteen days after the Wright Brothers' first successful airplane flight) and reprinted in the *Annual Report of the Smithsonian Institution for* 1903:

Now that an initial success has been achieved with a flying machine, we can discern some of the uses of such apparatus, and also some of its limitations. It doubtless will require some time and a good deal of experimenting, not devoid of danger, to develop the machine to practical utility. Its first application will probably be military. We can conceive how useful it might be in surveying a field of battle, or in patrolling mountains and jungles over which ordinary means of conveyance are difficult. In reaching otherwise inaccessible places, such as cliffs, in conveying messages, perhaps in carrying life lines to wrecked vessels, the flying machine may prove preferable to existing methods, and it may even carry mails in special cases, but the useful loads carried will be very small. The machines will eventually be fast, they will be used in sport, but they are not to be thought of as commercial carriers. To say nothing of the danger, the sizes must remain small and the passengers few, because the weight will, for the same design, increase as the cube of the dimensions, while the supporting surfaces will only increase as the square. It is true that when higher speeds become safe it will require fewer square feet of surface to carry a man, and that dimensions will actually decrease, but this will not be enough to carry much greater extraneous loads, such as a store of explosives or big guns to shoot them. The power required will always be great, say something like one horsepower to every hundred pounds of weight, and hence fuel can not be carried for long single journeys. The north pole and the interior of Sahara may preserve their secrets a while longer.

Upon the whole, navigable balloons and flying machines will constitute a great mechanical triumph for man, but they will not materialy upset existing conditions as has sometimes been predicted.

*Science News-Letter, December 8, 1928*

Paper that will not burn is an invention of a German chemist.

# FIRST GLANCES AT NEW BOOKS

HISTORIC AIRSHIPS—Rupert Sargent Holland—*Macrae-Smith* ($4). If you want a book to give to somebody, young or old, who is interested in aviation (and who, in these days, is not?) this is just the thing. From the early balloon voyages of Montgolfier, through the successful experiments of the Wright Brothers, up to Lindbergh, Byrd and Eckener—all these are in its 343 pages, and their story is interestingly and accurately told. The beautiful illustrations in color and halftone are an especially attractive feature, but one serious defect will tend to prevent the book's becoming an important reference work on the subject. That is the lack of an index.

*Aviation*
*Science News-Letter, December 8, 1928*

HEROES OF THE AIR—Chelsea Fraser—*Crowell* ($2). In this new edition of this book, the author has added accounts of achievements of aviators in 1927 and the first part of 1928, including the Bremen, the Friendship and the Southern Cross. Evidently in order to get the book out in time for the Christmas trade, the publishers have omitted an index, an inexcusable neglect.

*Aviation*
*Science News-Letter, December 8, 1928*

THE AIRPLANE AND ITS ENGINE—Charles Hugh Chatfield and Charles Fayette Taylor — *McGraw-Hill* ($2.50). A book for persons interested in acquiring a sound knowledge of the airplane who do not have time nor the inclination to give the subject the intensive study that would be required of the designing engineer or expert mechanic.

*Aviation*
*Science News-Letter, December 8, 1928*

SCIENCE AND GOOD BEHAVIOR—H. M. Parshley — *Bobbs Merrill* ($2.50). The ethics of a biologist. To make clear how he arrives at his theories of human conduct, the author goes back to the fundamentals of biology and traces the development of the mechanisms. The biologic survey of man, individually and collectively, leads him to the conclusion that religion and traditional philosophy have failed to guide the world toward happiness and freedom. It is argued that a successful ethics can be built up on science.

*Philosophy—Biology*
*Science News-Letter, December 8, 1928*

NATURAL MAN—Charles Hose—*Macmillan* ($10). A comprehensive account of the people of Borneo—and a readable book besides. The significance of these tribes, as Prof. Elliot Smith points out in the preface, is that they represent a series of primitive phases of culture that in most other parts of the world have been profoundly modified or have been completely suppressed by higher civilizations. These tribes, who have stood still while most of the world progressed, can shed considerable light on cultural origins. Referring to Dr. Hose's clear explanation of these people as being instinctively kind and exempt from the greed that civilization creates, Professor Smith makes the interesting comment: "If his book achieves no other purpose than to establish the fact of fundamental importance that man is by nature peaceful and good-natured, he will have achieved a revolution in anthropological doctrine."

*Ethnology*
*Science News-Letter, December 8, 1928*

THE ART OF THINKING—Ernest Dimnet—*Simon and Schuster* ($2.50). It seems strange to speak of a book with the French literary flavor of this one as "practical". But this essayist's thoughts on why we do not think and how we can think for ourselves constitute a liberal course in a subject still not included in most college courses of study.

*Psychology*
*Science News-Letter, December 8, 1928*

THE PSYCHOLOGY OF LANGUAGE—Walter B. Pillsbury and Clarence L. Meader—*Appleton* ($3). Explains what modern science knows about human speech, its origin, nervous mechanism, syntax, mental processes, and all the other angles of speech psychology. The collaborators on this valuable work are a professor of psychology and a professor of general linguistics, both at the University of Michigan.

*Psychology*
*Science News-Letter, December 8, 1928*

YOUR CHILD TODAY AND TOMORROW—Sidonie Matsner Gruenberg—*Lippincott* ($2.50). Mrs. Gruenberg has revised her book for the third edition, so that it includes the developments in child guidance during the last eight years. The book is thus thoroughly modern, but it avoids the radical and extreme among modern theories.

*Education*
*Science News-Letter, December 8, 1928*

THE HANDWRITING ON THE WALL—Arthur D. Little—*Little, Brown* ($2.50). A popular account of the value of industrial chemistry, by one of its most conspicuously successful practitioners. It not only pictures the rewards industrialists may reap by employing chemical researchers in their attack on problems that plague them, but also hints pointedly and pithily what is likely to happen to those who don't. It would be very appropriate as a Christmas present from a chemist to a "big boss"—especially if one has any likely young candidates messing up the laboratory.

*Industrial Chemistry*
*Science News-Letter, December 8, 1928*

HOUSEWIFERY—L. Ray Balderston—*Lippincott* ($3). Housekeeping is considered as a business in this manual. Directions are given both for actually doing all the work of the house and for organizing and directing such work. This includes direction of servants, purchasing of supplies, arrangement of the house and its contents. The book aims at greater efficiency so that the housewife can do her work better, with less effort and time. It is extremely practical and should be useful to the group of young housewives whose training and experience has all been in stores and offices rather than homes.

*Home Economics*
*Science News-Letter, December 8, 1928*

JUNIOR SCIENCE—John C. Hessler—*Sanborn* ($1.60). Using the question and answer style, the author tells in simple language the scientific facts that underlie our every-day life. Each chapter has exercises and summary. Pronounciation of scientific terms is given as they occur and in a glossary. The revised edition includes recent advances in nutrition, radio, aviation, telephotography, television and the like.

*General Science*
*Science News-Letter, December 8, 1928*

THOMAS CONDON—Ellen Condon McCornack—*University of Oregon Press* ($2.50). A biography of a geologist who went West to grow up with the country—and who certainly grew!

*Geology—Biography*
*Science News-Letter, December 8, 1928*

OPALS AND GOLD—R. M. Macdonald—*Lippincott* ($4). Adventures in search of treasure; the point is, they really happened.

*Travel—Mineralogy*
*Science News-Letter, December 8, 1928*

# New Disease Threatens Great Tree Crop

*Phytopathology*

Already depleted to a dangerous extent by indiscriminate lumbering methods and by forest fires, the timber supply of this country today faces a new menace in the form of a fungus disease, similar to chestnut blight, which has been discovered recently by the U. S. Department of Agriculture in two New England States.

Larch canker, as the disease is called, is characterized by Dr. Haven Metcalf, in charge of the Office of Forest Pathology, as "far and away the most potentially serious tree disease that has ever struck the United States." He described it, briefly, as "a parasitic fungus, well fixed to spread."

"Its danger," he states, "lies not in the fact that it is killing off larch trees, which are not commercially important, but that it attacks also the mighty Douglas fir and the yellow pine, the two most important timber trees in North America."

According to the Forest Service, the combined stands of these two trees represent, roughly, 854,000,000,000 board feet, valued at approximately $3,150,000,000. The Douglas fir alone covers more than 35,000,000 acres, one-fourth of the entire stand of soft timber. Twenty-five million acres are in the West and an additional 10,000,000 are in the Rocky Mountain section. These two forest areas are said to contain 596,000,000,000 board feet and to be worth $1,600,000,000.

Even a larger area is covered by the yellow pine. It occupies approximately 115,000,000 acres and represents 258,000,000,000 board feet, valued at $1,550,000,000.

Three thousand infected trees have been found in Massachusetts and one hundred in Rhode Island. The species attacked are the European, Japanese and American larch, or tamarack, the Douglas fir and the yellow pine.

Like chestnut blight, which was brought to this country on young trees imported from Japan, larch canker is a foreign disease, brought to this country on seedlings from Great Britain before the enactment of the Plant Quarantine Law.

Dr. Metcalf believes that it may have been here for ten years. The fungus does not differ, superficially, from less dangerous varieties and might easily have escaped detection. In Europe it has been known for about one hundred years and has been rather extensively studied. On larches it kills slowly, mutilating the tree and spoiling it for timber.


*Typical canker spots on the twig of a diseased larch*

In Europe, however, the disease has not attacked the Douglas fir, which is a native American species, so no precedent exists for knowing what its effect here will be. Nor is it known how rapidly the disease spreads. Larch canker is so widespread in Europe that there is no basis upon which pathologists can estimate how fast it has spread since it started.

The new disease spreads in a fashion identical with chestnut blight. Tiny spores, the reproductive bodies of the fungus, are blown by the wind and carried by water, insects, and birds from one tree to another. They lodge in the bark, where the canker starts. As the ugly growth penetrates the trunk of the pine or fir, a stream of pitch oozes out and spills down the side of the tree, leaving a whitish blotch.

It is a good three thousand miles from New England to the Douglas fir region on the Pacific Coast, but Dr. Metcalf declares that it would be a comparatively simple matter for the disease to reach that section should it get out of hand now. The larches form a veritable bridge across the North, upon which it could cross.

Northward, the larch forest ranges from Davis Strait to Alaska and the Yukon, in a continuous wide belt. From Davis Strait it extends southward, down the Atlantic seaboard, as far as Pennsylvania, Ohio and Illinois. It takes in the entire region of the Great Lakes, skirting Hudson Bay to the north, and covers parts of Iowa, Minnesota and North Dakota. At North Dakota the belt swings up into Canada toward the great stretches of the Yukon. And near British Columbia the Douglas fir and tamarack forests interlace.

All available weapons are being mobilized for combat. Burning out all trees known to be infected is considered the best method of control. Treating individual trees would not be worth while, Dr. Metcalf explains, because, even if a spray were discovered capable of saving them, it would prove a useless tool once a serious inroad started. The area menaced is too vast.

Forest rangers throughout the country have been notified to be on constant lookout for diseased trees and Dr. Metcalf is conducting a thorough investigation of the nature of the canker. Special studies are now being made in branch laboratories of the Department of Agriculture at Amherst, Massachusetts, and at Providence, Rhode Island.

A serious difficulty complicating the problem is political, occasioned by the fact that the tamarack "bridge" crosses the border at North Dakota into Canada, meeting the Douglas fir forest on the Canadian side. This species, so important in the United States, does not grow extensively in Canada and, since the larch is of little value, it may not be possible to secure the active cooperation of Canadian officials in the efforts of this country to prevent infection of the western preserves.

Another difficulty lies in the fact that the disease is not readily diagnosed by the layman. Unless it is in a typical form, larch canker is not easily differentiated from other fungi, though an average boy, given one day's instruction, can recognize it in nine cases out of ten.

*Science News-Letter, December 8, 1928*